Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

Web Address: www.dom.com

Dominion

February 3, 2017

RECEIVED
FEB 09 2017
WV DEP / DIV OF AIR QUALITY

BY: OVERNIGHT MAIL

Mr. William F. Durham, Director
WVDEP - Division of Air Quality
601 57th Street SE
Charleston, West Virginia 25304

RE: Permit Determination Application (45CSR13)
Long Run Metering and Regulation Station

Dear Mr. Durham,

Dominion Resources, Inc. is proposing to expand its interstate natural gas pipeline system in West Virginia as part of the Atlantic Coast Pipeline (ACP) project. This request is for a permit determination to confirm that the construction of the Long Run M&R Station will not require ACP to seek the authority to construct through a Rule 13 Air Permit.

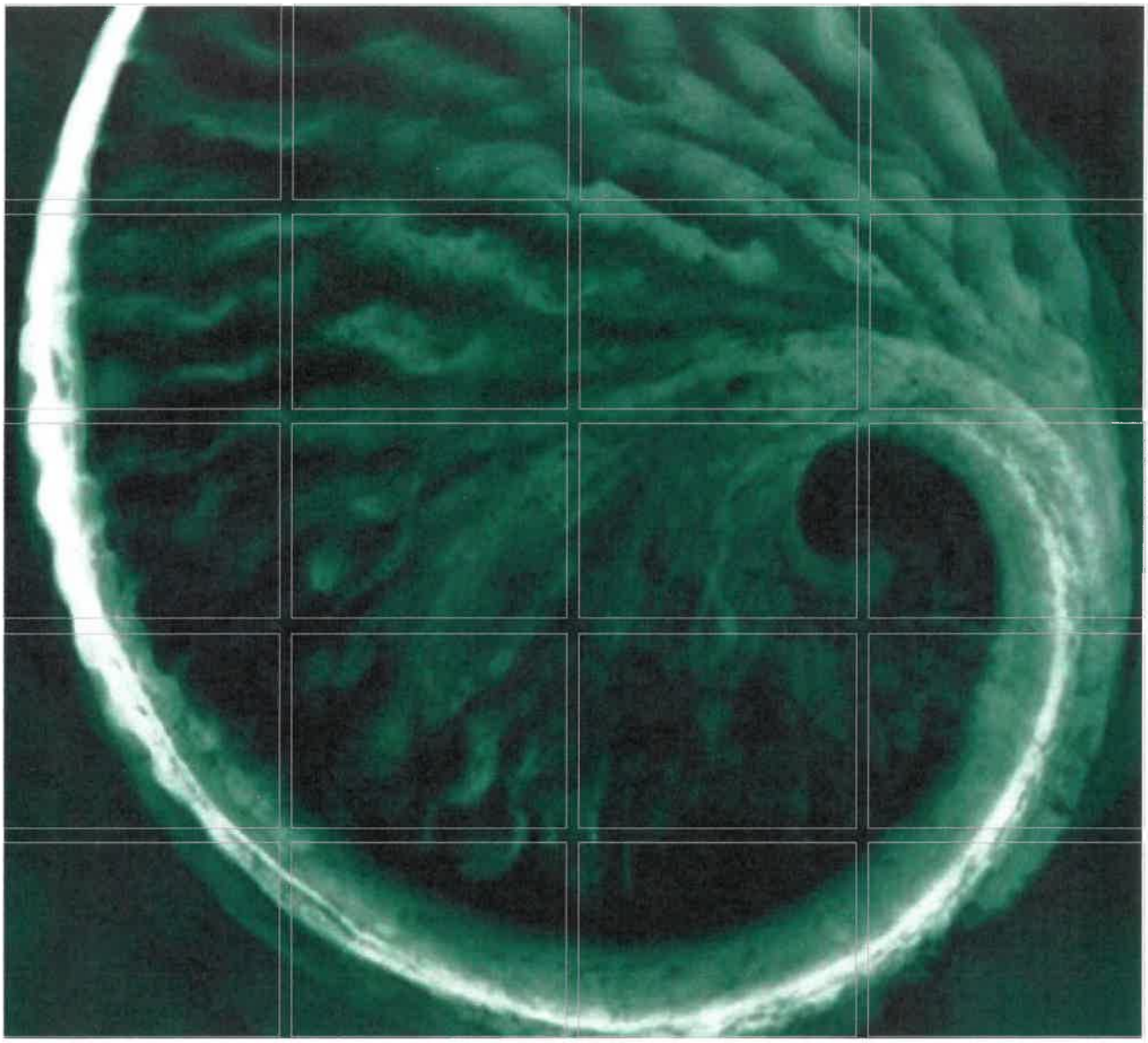
ACP plans to install the following emission sources at the Station:

- Four (4) line heaters, each with 2 burners, for a total heat input rating of 9.8 MMBtu/hr per line heater; and
- Two (2) thermoelectric non-emergency generators each rated at 55 kW.

Should you have any questions or need additional information, please feel free to contact Laurence Labrie at (804) 273-3075 or via email at laurence.a.labrie@dom.com.

Sincerely,

Richard B. Gangle, Manager
Supply Header Project
Dominion Environmental Services



Prepared For:

Atlantic Coast Pipeline

Atlantic Coast Pipeline, LLC

Atlantic Coast Pipeline Project
Request for Permit Determination
Long Run M&R Station
Randolph County, WV

January 2017

Environmental Resources Management
75 Valley Stream Parkway, Suite 200
Malvern, PA 19355

www.erm.com

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The business of sustainability

ERM

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1.0 INTRODUCTION

1.1 BACKGROUND

Atlantic Coast Pipeline, LLC (ACP) proposes to construct and operate an approximately 600-mile-long interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The proposed project has the capacity to deliver 1.5 billion standard cubic feet of natural gas per day (bscf/d) from Pennsylvania and West Virginia to power generation facilities and other end-users.

ACP proposes to construct and operate the Long Run M&R Station in Randolph County, West Virginia to provide operational activities associated with the metering and regulating natural gas.

2.0 *FACILITY AND PROJECT DESCRIPTION*

2.1 *LONG RUN M&R STATION*

The Long Run M&R Station will operate in Randolph County, WV. This station meters natural gas pressure and flow. The station regulates flow by diverting into third party pipelines.

ACP plans to install the following emission sources at the Station:

- Four (4) line heaters, each with 2 burners, for a total heat input rating of 9.8 MMBtu/hr per line heater; and
- Two (2) thermoelectric non-emergency generators (TEG) each rated at 55 kW.

2.2 *STATEMENT OF AGGREGATION*

The Long Run M&R Station will be located in Randolph County, WV and will be operated by ACP. Stationary sources of air pollutants may require aggregation of total emission levels if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties. ACP will operate the Long Run M&R Station with the same industrial grouping as nearby facilities, and some of these facilities are under common control. ACP, however, is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

ACP is the sole operator of the Long Run M&R Station. ACP is also the sole operator of other M&R and compressor stations in the area. Therefore, ACP does qualify as having nearby operations under common control.

There are no ACP owned or operated sites within a one-quarter (1/4) mile radius of the Long Run M&R Station. Nearby sites do not meet the definition of contiguous or adjacent properties since they are not in contact and do not share a common boundary. Furthermore, operations separated by this distance do not meet the common sense notion of a "plant."

On June 3, 2016 the EPA Administrator published the *Source Determination for Certain Emission Units in the Oil and Natural Gas Sector*. This notice clarifies how properties in the oil and natural gas sector are determined to be adjacent in order to assist permitting authorities and permit applicants in making consistent

source determinations. The following regulatory text defines "adjacent" for the oil and gas sector in terms of proximity.

> *Pollutant emitting activities shall be considered adjacent if they are located on the same surface site, or on surface sites that are located within ¼ mile of one another.*

No other ACP sites are located within a ¼ mile of the EPA's proposed ruling. Although the applicant notes the proposed status of this adjacency determination, it is the only guidance available on a finite distance affecting the adjacency determination, and has been noted due to lack of finalized guidance. Based upon the proximity of nearby facilities, ACP does not believe aggregation based upon adjacency is required.

Based on the above reasoning, ACP is not subject to the aggregation of stationary emission sources since the stationary sources are not considered contiguous or adjacent facilities.

3.0 FEDERAL REGULATORY REQUIREMENTS

3.1 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS have been established by the EPA to limit air pollutant emissions from certain categories of new and modified stationary sources. The NSPS regulations are contained in 40 CFR Part 60 and cover many different source categories, and applicable categories are described below.

3.1.1 *40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)*

Subpart JJJJ sets forth nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine.

The Cummins 55kW non-emergency Generators are EPA Certified 4 stroke rich burn (4SRB) spark ignition (SI) engines manufactured in 2015. Per 40 CFR 60.4230(a)(4)(iii), the Cummins engines are subject to the provisions in 40 CFR 60 Subpart JJJJ.

In accordance with 40 CFR 60.4243(b)(1), ACP, LLC must operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, as well as and maintain records of conducted maintenance in order to demonstrate compliance. Additionally, the Cummins generators are subject to the general compliance provisions of 40 CFR 1068 Subparts A-D.

Performance testing is not required for these certified engines.

3.1.2 *40 CFR 60, Subpart OOOOa (Standards of Performance for Crude oil and Natural Gas Facilities for Which Construction, Modification, or Reconstruction Commenced After September 18, 2015)*

Subpart OOOOa establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015.

The Long Run M&R Station will not qualify as an affected facility under this Rule. The station will not operate any compressor engines, fluid tanks, pneumatic pumps, and is not a well site nor compressor station (with respect to the definition of affected facility for the collection of fugitive emission components).

The pneumatic controllers installed at this facility will be intermittent bleed rate devices.

3.2 *NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)*

NESHAP regulations established in 40 CFR Part 61 and Part 63 regulate emission of air toxics. NESHAP standards primarily apply to major sources of Hazardous Air Pollutants (HAPs), though some Subparts of Part 63 have been revised to include area (non-major) sources. The NESHAP regulations under 40 CFR Part 61 establish emission standards on the pollutant basis whereas 40 CFR Part 63 establishes the standards on a source category basis. The Long Run M&R Station will not emit any single HAP in excess of 10 tpy and will not emit combined HAPS in excess of 25 tpy, and will therefore be designated as an area source of HAPs.

3.2.1 *40 CFR 63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)*

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAPs) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This Subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

The Long Run M&R Station has two Cummins 55kW EPA Certified 4 stroke rich burn (4SRB) spark ignition (SI) engines. The engines will meet the requirements of 40 CFR 60 Subpart JJJJ. By doing so, these engines also satisfy the requirements of 40 CFR 63 Subpart ZZZZ per 40 CFR 63.6590(c). Affected sources that meet the requirements of 40 CFR 63.6590(c)(1), have no further applicable requirements under 40 CFR 63 Subpart ZZZZ.

4.0 STATE REGULATORY APPLICABILITY

This section outlines the State air quality regulations that could be reasonably expected to apply to the Long Run M&R Station and makes an applicability determination for each regulation based on activities planned at the Station and the emissions of regulated air pollutants associated with this project. This review is presented to supplement and/or add clarification to the information provided in the WVDEP Permit Determination Forms..

The regulatory requirements in reference to the Long Run M&R Station are described in detail in Table 4-1.

TABLE 5.1 STATE REGULATORY APPLICABILITY

Regulatory Applicability	Applicable Requirement	Compliance Approach
Particulate Emissions (45 CSR 02)	The line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input ratings are less than 10 MMBtu/hr.	NA
Objectionable Odors (45 CSR 04)	Prevent the discharge of air pollutants that contribute to objectionable odors.	Operations conducted at the Long Run M&R Station are subject to this requirement. Based on the nature of the processes at the site, the presence of objectionable odors is unlikely.
Sulfur Oxides (45 CSR 10)	The line heaters are indirect heat exchangers that combust natural gas but are exempt since the heat input ratings are less than 10 MMBtu/hr.	NA
Stationary Source Permitting (45 CSR 13)	This permit determination is being submitted for the construction of the listed equipment for the Long Run M&R Station. The facility's potential total emissions do not exceed the thresholds listed in 45 CSR 13-2 and therefore Long Run is not considered a stationary source.	Submit Request for Permit Determination to WVDAQ
Construction and Major Modification of Major Sources for the Prevention of Significant Deterioration (45 CSR 14)	Operation of equipment at this Long Run M&R Station will not exceed the PSD emission triggers.	NA
New Source Performance	The Station is required to comply	See Section 3.1

Regulatory Applicability	Applicable Requirement	Compliance Approach
Standards (45 CSR 16)	with applicable NSPS Standards.	
Construction and Major Modification of Major Source Causing or Contributing to Nonattainment (45 CSR 19)	Randolph County, WV is in attainment for all pollutants with a National Ambient Air Quality Standard (NAAQS). Therefore, this regulation does not apply to the Long Run M&R Station.	NA
Hazardous Waste (45 CSR 25)	This Station does not qualify as a waste treatment, storage, and disposal facility and no hazardous waste will be burned at this Site; therefore, it is not subject to this hazardous waste rule.	NA
Title V Operating Permits (45 CSR 30)	The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the Station is not a major source for Title V purposes.	NA
NESHAP Rues (45 CSR 34)	Station complies with applicable NESHAP regulations by complying with 40 CFR Part 60, Subpart JJJJ NSPS regulations.	See Section 3.2

5.0 SITE WIDE EMISSIONS

TABLE 5.1 LONG RUN M&R SITE WIDE EMISSIONS

Pollutant	Long Run M&R Potential to Emit (PTE) (lbs/hr)	Long Run M&R Potential to Emit (PTE) (tons/year)
Nitrogen Oxides	3.99	17.47
Carbon Monoxide	3.73	16.33
Volatile Organic Compounds	0.44	1.95
Particulate Matter - 10/2.5	0.29	1.29
Sulfur Dioxide	0.02	0.10
Any Single Hazardous Air Pollutant	0.07	0.29
Total Hazardous Air Pollutants	0.09	0.38

As presented in the table above and in Attachment E, the PTEs from the Long Run M&R Station are less than the permitting thresholds listed in 45 CSR 13 Section 2 and Table 45-13A. As such, ACP submits this request for permit determination to the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) to receive confirmation that the construction of the Long Run M&R Station will not require ACP to seek the authority to construct through a Rule 13 Air Permit.

APPENDICES

APPENDIX A

WVDAQ REQUEST FOR DETERMINATION FORMS

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
Atlantic Coast Pipeline, LLC.

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
Long Run M&R Station

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
486210

4A. MAILING ADDRESS:
707 E. Main Street, Richmond, VA 23216

4B. PHYSICAL ADDRESS:
County Route 42/1, Mabie, WV 26278

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**): Traveling East along US-119 N/US-33 E towards Buckhannon take the County Rd 12/Main St. exit onto Old Weston Rd./West Main St. Turn right on the exit and travel for 0.6 miles before taking a right onto S. Locust St. Continue for 1.7 miles and take a left onto Tallmansville Road. Drive for 1.7 miles. At the fork, turn right, to stay on Tallmansville Road. Travel for 9.2 miles and take a route on the first fork onto Adrian-Abbott Gould. At the second fork, go left, travel County Route 30/19 for 4.7 miles, and turn left Tallmansville Road. Take the next right onto Hemlock and travel for 2 miles. At the four-way intersection, take a left onto Long Run. Travel for 1.5 miles, and the Long Run M&R site will be located on the left.

5B. NEAREST ROAD:
County Route 42/1

5C. NEAREST CITY OR TOWN:
Mabie

5D. COUNTY:
Randolph

5E. UTM NORTHING (KM):
4291.82

5F. UTM EASTING (KM):
578.78

5G. UTM ZONE:
17S

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
Laurence Labrie

6B. TITLE: Environmental Projects Advisor

6C. TELEPHONE:
(804) 273-3075

6D. FAX:

6E. E-MAIL:
laurence.a.labrie@dom.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
___ ___ ___ – ___ ___ ___ ___ ___

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST: No

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☒ **NEW SOURCE** ☐ **ADMINISTRATIVE UPDATE**
☐ **MODIFICATION** ☐ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ **YES** ☐ **NO**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☐ **YES** ☒ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
04/01/2018.

10B. DATE OF ANTICIPATED START-UP:
10/01/2019.

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**.

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**.

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	**HOURLY PTE** (LB/HR)	**YEARLY PTE** (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.29	1.29
PM_{10}	0.29	1.29
VOCs	0.44	1.95
CO	3.73	16.33
NO_x	3.99	17.47
SO_2	0.02	0.10
Pb	<0.001	<0.001
HAPs (AGGREGATE AMOUNT)	0.09	0.38
TAPs (INDIVIDUALLY)*	--	--
OTHER (INDIVIDUALLY)*	--	--

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E.**

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, Leslie Hartz (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL******** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____

TITLE: Vice President Pipeline Construction DATE: 2 / 2 / 17

****** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☒ **ATTACHMENT A** ☒ **ATTACHMENT B** ☒ **ATTACHMENT C** ☐ **ATTACHMENT D** ☒ **ATTACHMENT E**

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

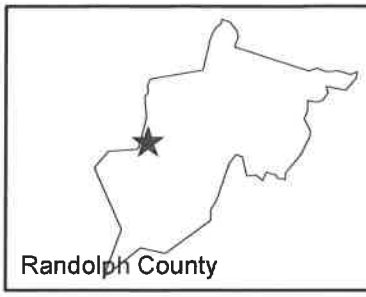
www.dep.wv.gov/daq

Table of Contents

Attachment A

Location Map

West Virginia



0 1,000 2,000 4,000 6,000
Feet

N

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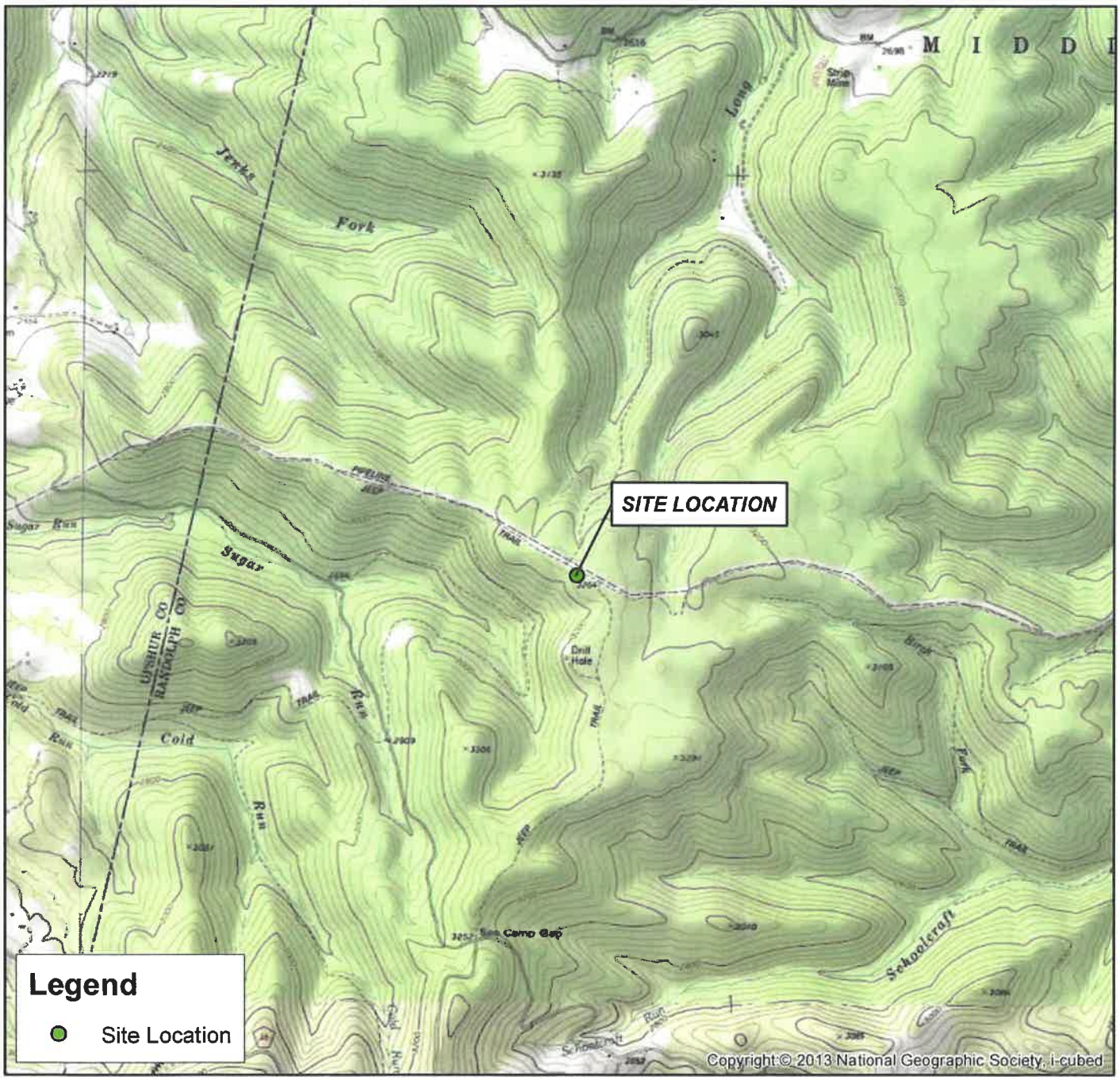
RANDOLPH COUNTY
WEST VIRGINIA



Legend

Site Location

USGS 1:24K 7.5' Quadrangle:
Cassity, WV

SITE LOCATION MAP

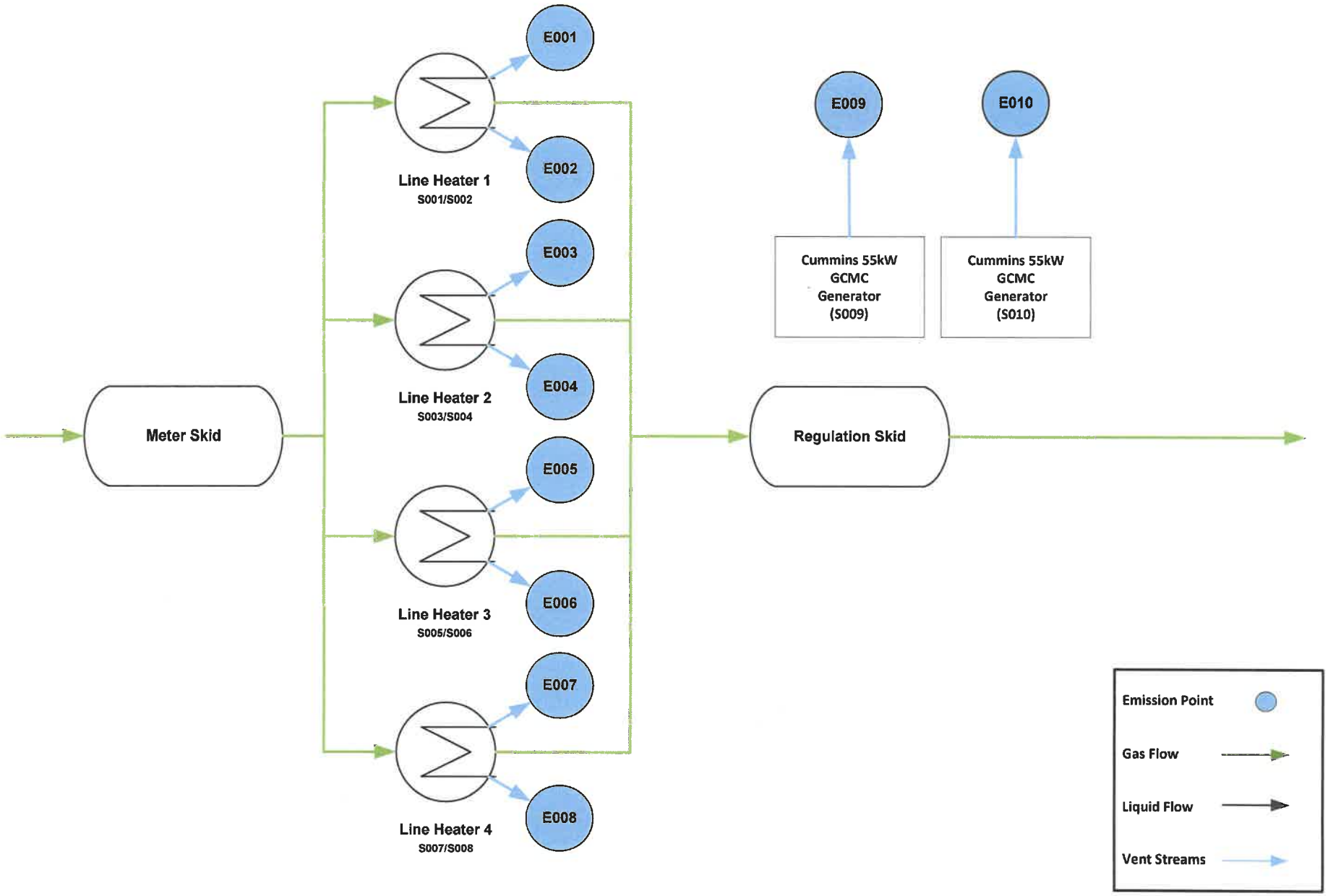
ERM	**Atlantic Coast Pipeline, LLC** Long Run M&R Station Mill Creek, West Virginia Randolph County	GIS Review: GM CHK'D: GM 0345197
Drawn By: SRV-9/23/16	**Environmental Resources Management**	ATTACHMENT A

J:\GIS\Projects\SiteLocationMaps\Atlantic Coast Pipeline, LLC_MXD\AttachmentA-SiteLocationMap.mxd - 9/23/2016|SRV

Attachment B

Process Flow Diagram

Attachment B
Long Run Natural Gas M&R Station
Proposed Process Flow Diagram



Attachment C

Process Description

Attachment C
Process Description

This permit determination form is being filed for Atlantic Coast Pipeline, LLC (ACP) and addresses operational activities associated with the Long Run M&R Station. The Long Run M&R Station measures the flow and pressure of incoming raw natural gas and regulates the fluid to connecting pipelines.

A regulation and meter skid powered by four (4) line heaters, each with two (2) burners (S001-S008) facilitate the station operations. The site additionally contains two (2) non-emergency Cummins 55kW Generators (S009-S010).

A process flow diagram is included as Attachment B.

Attachment E

Supporting Calculations

Table 1 - M&R Heater Emissions (S001 - S008)
Long Run M&R Station - Randolph County, West Virginia
Atlantic Coast Pipeline

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis Source	Boiler Rating (MMBtu/hr)	Heating Value of Natural Gas (Btu/scf)	Hourly Emissions (lb/hr)	Hourly Emissions (tpy)
NOx	100.00	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.92	4.01
CO	84.00	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.77	3.37
VOC	5.50	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.05	0.22
SO2	0.6	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.01	0.02
PMF	1.9	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.02	0.08
PMF-10	7.6	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.07	0.30
PMF-2.5	7.6	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.07	0.30
PMC	5.7	lb/MMscf	AP-42 Chapter 1.4	9.8	1,070	0.05	0.23
CO2	53.06	kg CO_2/MMBtu	40 CFR 98 Subpart C	9.8	1,070	1146.38	5021.13
CH4	0.001	kg CH_4/MMBtu	40 CFR 98 Subpart C	9.8	1,070	0.02	0.09
N_2O	0.0001	kg N_2O/MMBtu	40 CFR 98 Subpart C	9.8	1,070	0.002	0.01
CO_{2e}						1147.56	5026.31

Notes:
- The Long Run Station will operate two line heaters, each with two burners. For this submittal, each natural gas-fired burner is treated as an individual emission source.
- Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all line heaters are displayed in the Total Site Emissions Table.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 1.4 references are from the July 1998 revision.
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:
Max. Hourly Emission Rate **(lb/hr)** = Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating **(MMBtu/hr)**

Table 2 - Cummins 55kW GCMC Generator Emissions (S009 - S010)
Long Run M&R Station - Randolph County, West Virginia
Atlantic Coast Pipeline

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis Source	Power Rating (kW)	High Heating Value Natural Gas (Btu/scf)	Natural Gas Usage (ft^3/hr)	Hourly Emissions (lb/hr)	Hourly Emissions (tpy)
NOx	1.00	g/hp-hr	EPA Cert. of Conformity	55	1,070	744	0.1626	0.71
CO	2.00	g/hp-hr	EPA Cert. of Conformity	55	1,070	744	0.3253	1.42
VOC	0.70	g/hp-hr	EPA Cert. of Conformity	55	1,070	744	0.1138	0.50
SO2	0.000588	lb/MMBtu	AP-42 Chapter 3.2	55	1,070	744	0.0005	0.00
PMF	0.0095	lb/MMBtu	AP-42 Chapter 3.2	55	1,070	744	0.008	0.03
PMF-10	0.0095	lb/MMBtu	AP-42 Chapter 3.2	55	1,070	744	0.008	0.03
PMF-2.5	0.0095	lb/MMBtu	AP-42 Chapter 3.2	55	1,070	744	0.008	0.03
PMC	0.00991	lb/MMBtu	AP-42 Chapter 3.2	55	1,070	744	0.008	0.03
CO2	53.06	kg CO_2/MMBtu	40 CFR 98 Subpart C	55	1,070	744	93.1232	407.88
CH4	0.001	kg CH_4/MMBtu	40 CFR 98 Subpart C	55	1,070	744	0.0018	0.0077
N_2O	0.0001	kg N_2O/MMBtu	40 CFR 98 Subpart C	55	1,070	744	0.00018	0.0008
CO_{2e}							93.22	408.30

Notes:
- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG generator.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-3 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr)** = Emission Factor **(lb/10^6 scf)** ÷ Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating **(MMBtu/hr)**

Table 3 - Potential Emissions From Fugitive Leaks
ACP Long Run M&R Station - Randolph County, West Virginia
Atlantic Coast Pipeline

Fugitive Emissions (FUG)

Source Designation:	Fugitive Leaks - Piping

Default Average Component Counts for Natural Gas Gathering and Boosting Equipment

Facility Equipment Type	Valves	Connectors	Open-ended Lines	Pressure Relief Valves
Wellheads	8	38	0.5	0
Separators	1	6	0	0
Meters/Piping	12	45	0	0
Compressors	12	57	0	0
In-line Heaters	14	65	2	1
Dehydrators	24	90	2	2

Site Specific Equipment Counts

Facility Equipment Type	Count on Site
Wellheads	0
Separators	1
Meters/Piping	4
Compressors	0
In-line Heaters	4
Dehydrators	0

Operational Parameters:

Annual Hours of Operation (hr/yr):	8,760

Pipeline Natural Gas Fugitive Emissions

Equipment	Service	Emission Factor[1] lb/hr/source	Source Count[2]	Total HC Potential Emissions lb/hr	Total HC Potential Emissions tpy	VOC Weight Fraction	VOC Emissions tpy	CO_2 Weight Fraction	CO_2 Emissions tpy	CH_4 Weight Fraction	CH_4 Emissions tpy	HAP Weight Fraction	HAP Emissions tpy
Valves	Gas	4.50E-03	105	0.47	2.1	0.026	0.054	0.0271	0.056	0.895	1.9	0.15%	3.06E-03
Pump Seals	Gas	2.40E-03	0	0.00	0.00	0.026	0.00	0.0271	0.000	0.895	0.00	0.15%	0.00E+00
Others (compressors and others)	Gas	8.80E-03	0	0.00	0.00	0.026	0.00	0.0271	0.000	0.895	0.00	0.15%	0.00E+00
Connectors	Gas	2.00E-04	416	8.92E-02	3.91E-01	0.026	1.02E-02	0.0271	1.06E-02	0.895	3.50E-01	1.48E-03	5.78E-04
Flanges	Gas	3.90E-04	8	0.003	0.014	0.026	0.000	0.0271	0.000	0.895	0.012	1.48E-03	2.02E-05
Open-ended lines	Gas	2.00E-03	4	0.01	0.04	0.026	0.00	0.0271	0.001	0.895	0.031	1.48E-03	5.19E-05
			Total	0.57	2.51	-	0.07	-	0.07	-	2.24	-	3.71E-03

1. EPA Protocol for Equipment Leaks Emissions Estimate (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Emission Factors.
2. Component count based on Basic Systems Engineering Estimate.

Sample Calculations:

Potential Emissions (lb/hr) = Emission Factor (lb/hr/source) * Source Count

Potential Emissions (tons/yr) = $(lb/hr)_{Potential}$ × Hours of Operation (hr/yr) × (1 ton/2,000 lb).

Gas Composition

Pollutant	Molecular Weight (lb/lb-mol)	Molar (Volume) Fraction (mol%)	Wt. Fraction[1] (wt. %)
Total Stream Molecular Weight	16.89		
Non-VOC			
Carbon Dioxide	44.01	1.041%	2.71%
Nitrogen	28.01	0.994%	1.65%
Methane	16.04	94.21%	89.47%
Ethane	30.07	2.923%	5.20%
VOC			
Propane	44.10	0.546%	1.43%
n-Butane	58.12	0.084%	0.29%
IsoButane	58.12	0.079%	0.27%
n-Pentane	72.15	0.022%	0.09%
IsoPentane	72.15	0.024%	0.10%
n-Hexane	78.11	0.032%	0.15%
n-Heptane	100.21	0.049%	0.29%
Total VOC Fraction			**2.62%**
Total HAP Fraction			**0.15%**

Gas speciation based on a natural gas hydrocarbon composition from Engineering Technology Incorporated Combustion Analysis.

Table 4 - Hazardous Air Pollutant Emissions Summary Table
Long Run M&R Station - Randolph County, West Virginia
Atlantic Coast Pipeline

Natural Gas High Heating Value (Btu/scf): 1070

M&R Heater Specifications and Configuration:

Number of M&R Heaters: 8
M&R Process Heater Rating (MMBtu/hr): 4.9

Cummins GGMC Specifications and Configuration:

Number of Cummins GGMC Engines: 2
Cummins Engine Natural Gas Usage (scf/hr): 744

Pollutant	HAP?	M&R Heater	CAT G3304B	M&R Heaters		Cummins Gen		Fugitive Emissions		Total HAPs Emissions	
		lb/MMscf	lb/MMBtu	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
1,1,2,2-Tetrachloroethane	Yes		2.53E-05			2.01E-05	8.82E-05			4.03E-05	1.76E-04
1,1,2-Trichloroethane	Yes		1.53E-05			1.22E-05	5.33E-05			2.44E-05	1.07E-04
1,1-Dichloroethane	Yes		1.13E-05			9.00E-06	3.94E-05			1.80E-05	7.88E-05
1,2,3-Trimethylbenzene	No										
1,2,4-Trimethylbenzene	No										
1,2-Dichloroethane	Yes		1.13E-05			9.00E-06	3.94E-05			1.80E-05	7.88E-05
1,2-Dichloropropane	Yes		1.02E-07			8.15E-08	3.57E-07			1.63E-07	7.14E-07
1,3,5-Trimethylbenzene	No										
1,3-Butadiene	Yes		6.63E-04			5.28E-04	2.31E-03			1.06E-03	4.62E-03
1,3-Dichloropropene	Yes		1.27E-05			1.01E-05	4.43E-05			2.02E-05	8.86E-05
2,2,4-Trimethylpentane	Yes										
2-Methylnaphthalene	No	2.4E-05		1.10E-07	4.81E-07						
3-Methylchloranthrene	No	1.8E-06		8.24E-09	3.61E-08						
7,12-Dimethylbenz(a)anthracene	No	1.6E-05		7.33E-08	3.21E-07						
Acenaphthene	No	1.8E-06		8.24E-09	3.61E-08						
Acenaphthylene	No	1.8E-06		8.24E-09	3.61E-08						
Acetaldehyde	Yes		2.79E-03			2.22E-03	9.73E-03			4.44E-03	1.95E-02
Acrolein	Yes		2.63E-03			2.09E-03	9.17E-03			4.19E-03	1.83E-02
Anthracene	No	2.4E-06		1.10E-08	4.81E-08						
Benz(a)anthracene	No	1.8E-06		8.24E-09	3.61E-08						
Benzene	Yes	2.1E-03	1.58E-03	9.62E-06	4.21E-05	1.26E-03	5.51E-03			2.59E-03	1.14E-02
Benzo(a)pyrene	No	1.2E-06		5.50E-09	2.41E-08						
Benzo(b)fluoranthene	No	1.8E-06		8.24E-09	3.61E-08						
Benzo(e)pyrene	No										
Benzo(g,h,i)perylene	No	1.2E-06		5.50E-09	2.41E-08						
Benzo(k)fluoranthene	No	1.8E-06		8.24E-09	3.61E-08						
Biphenyl	Yes										
Butane	No	2.1E+00		9.62E-03	4.21E-02						
Butyr/Isobutyraldehyde	No		4.86E-05			3.87E-05	1.69E-04				
Carbon Tetrachloride	Yes		1.77E-05			1.41E-05	6.17E-05			2.82E-05	1.23E-04
Chlorobenzene	Yes		1.29E-05			1.03E-05	4.50E-05			2.05E-05	9.00E-05
Chloroethane	Yes										
Chloroform	Yes		1.37E-05			1.09E-05	4.78E-05			2.18E-05	9.55E-05
Chrysene	No	1.8E-06		8.24E-09	3.61E-08						
Cyclohexane	No										
Cyclopentane	No										
Dibenzo(a,h)anthracene	No	1.2E-06		5.50E-09	2.41E-08						
Dichlorobenzene	Yes	1.2E-03		5.50E-06	2.41E-05					4.40E-05	1.93E-04
Ethane	No	3.1E+00	7.04E-02	1.42E-02	6.22E-02	5.60E-02	2.45E-01				
Ethylbenzene	Yes		2.48E-05			1.97E-05	8.65E-05			3.95E-05	1.73E-04
Ethylene Dibromide	Yes		2.13E-05			1.70E-05	7.43E-05			3.39E-05	1.49E-04
Fluoranthene	No	3.0E-06		1.37E-08	6.02E-08						
Fluorene	No	2.8E-06		1.28E-08	5.62E-08						
Formaldehyde	Yes	7.5E-02	2.05E-02	3.43E-04	1.50E-03	1.63E-02	7.15E-02			0.04	0.15
Hexane (or n-Hexane)	Yes	1.8E+00		8.24E-03	3.61E-02			8.48E-04	3.71E-03	0.07	0.29
Indeno(1,2,3-c,d)pyrene	No	1.8E-06		8.24E-09	3.61E-08						
Isobutane	No										
Methanol	Yes		3.06E-03			2.44E-03	1.07E-02			0.005	0.02
Methylcyclohexane	No										
Methylene Chloride	Yes		4.12E-05			3.28E-05	1.44E-04			6.56E-05	2.87E-04
n-Nonane	No										
n-Octane	No										
Naphthalene	Yes	6.1E-04	9.71E-05	2.79E-06	1.22E-05	7.73E-05	3.39E-04			1.77E-04	7.75E-04
PAH	Yes		1.41E-04			1.12E-04	4.92E-04			2.24E-04	9.83E-04
Pentane (or n-Pentane)	No	2.6E+00		1.19E-02	5.22E-02						
Perylene	No										
Phenanthrene	No	1.7E-05		7.79E-08	3.41E-07						
Phenol	Yes										
Propane	No	1.6E+00		7.33E-03	3.21E-02						
Propylene Oxide	Yes										
Pyrene	No	5.0E-06		2.29E-08	1.00E-07						
Styrene	Yes		1.19E-05			9.47E-06	4.15E-05			1.89E-05	8.30E-05
Tetrachloroethane	No										
Toluene	Yes	3.4E-03	5.58E-04	1.56E-05	6.82E-05	4.44E-04	1.95E-03			1.01E-03	4.44E-03
Vinyl Chloride	Yes		7.18E-06			5.72E-06	2.50E-05			1.14E-05	5.01E-05
Xylene	Yes		1.95E-04			1.55E-04	6.80E-04			3.10E-04	1.36E-03
Arsenic	Yes	2.0E-04		9.16E-07	4.01E-06					7.33E-06	3.21E-05
Barium	No	4.4E-03		2.01E-05	8.83E-05						
Beryllium	Yes	1.2E-05		5.50E-08	2.41E-07					4.40E-07	1.93E-06
Cadmium	Yes	1.1E-03		5.04E-06	2.21E-05					4.03E-05	1.77E-04
Chromium	Yes	1.4E-03		6.41E-06	2.81E-05					5.13E-05	2.25E-04
Cobalt	Yes	8.4E-05		3.85E-07	1.68E-06					3.08E-06	1.35E-05
Copper	No	8.5E-04		3.89E-06	1.70E-05						
Manganese	Yes	3.8E-04		1.74E-06	7.62E-06					1.39E-05	6.10E-05
Mercury	Yes	2.6E-04		1.19E-06	5.22E-06					9.53E-06	4.17E-05
Molybdenum	No	1.1E-03		5.04E-06	2.21E-05						
Nickel	Yes	2.1E-03		9.62E-06	4.21E-05					7.69E-05	3.37E-04
Selenium	Yes	2.4E-05		1.10E-07	4.81E-07					8.79E-07	3.85E-06
Vanadium	No	2.3E-03		1.05E-05	4.61E-05						
Zinc	No	2.9E-02		1.33E-04	5.82E-04						
Lead	Yes	5.0E-04		2.29E-06	1.00E-05					1.83E-05	8.02E-05
Total HAPs				0.009	0.038	0.026	0.113	0.001	0.004	0.122	0.533

Table 5 - Project Potential Emissions
Long Run M&R Station - Randolph County, West Virginia
Atlantic Coast Pipeline

Equipment	Fuel	Power Rating	Units	Hours	Criteria Pollutants (lb/hr)								GHG Emissions (lb/hr)				HAP (lb/hr)
					NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	Total HAP
M&R Heater 1 (S001-S002)	Natural Gas	9.8	MMBtu/hr	8760	0.92	0.77	0.05	0.005	0.02	0.07	0.07	0.05	1,146	0.02	0.002	1,148	0.01
M&R Heater 2 (S003-S004)	Natural Gas	9.8	MMBtu/hr	8760	0.92	0.77	0.05	0.005	0.02	0.07	0.07	0.05	1,146	0.02	0.002	1,148	0.01
M&R Heater 3 (S005-S006)	Natural Gas	9.8	MMBtu/hr	8760	0.92	0.77	0.05	0.005	0.02	0.07	0.07	0.05	1,146	0.02	0.002	1,148	0.01
M&R Heater 4 (S007-S008)	Natural Gas	9.8	MMBtu/hr	8760	0.92	0.77	0.05	0.005	0.02	0.07	0.07	0.05	1,146	0.02	0.002	1,148	0.01
Cummins GCMC Generator (S009)	Natural Gas	55.0	kW	8760	0.16	0.33	0.11	0.0005	0.0076	0.0076	0.0076	0.01	93.12	0.002	0.0002	93.22	0.03
Cummins GCMC Generator (S010)	Natural Gas	55.0	kW	8760	0.16	0.33	0.11	0.0005	0.0076	0.0076	0.0076	0.01	93.12	0.002	0.0002	93.22	0.03
Fugitive Leaks - Piping	-	-	-	-	-	-	0.02	-	-	-	-	-	0.02	0.51	-	12.83	0.001
Total (lb/hr)					**3.99**	**3.73**	**0.44**	**0.02**	**0.08**	**0.29**	**0.29**	**0.22**	**4,771.77**	**0.60**	**0.009**	**4,789.51**	**0.09**
WV Permit Threshold					6 lb/hr AND 10 TPY								N/A				
Total (lb/day)					***95.73***	***89.47***	***10.66***	***0.55***	***2.03***	***7.05***	***7.05***	***5.39***	***114,522.38***	***14.46***	***0.22***	***114,948.14***	***2.09***
WV Permit Threshold					144 lb/day								N/A				

Equipment	Fuel	Power Rating	Units	Hours	Criteria Pollutants (tons/yr)								GHG Emissions (tons/yr)				HAP (tpy)
					NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	Total HAP
M&R Heater 1 (S001-S002)	Natural Gas	9.8	MMBtu/hr	8760	4.01	3.37	0.22	0.02	0.08	0.30	0.30	0.23	5,021	0.09	0.01	5,026	0.04
M&R Heater 2 (S003-S004)	Natural Gas	9.8	MMBtu/hr	8760	4.01	3.37	0.22	0.02	0.08	0.30	0.30	0.23	5,021	0.09	0.01	5,026	0.04
M&R Heater 3 (S005-S006)	Natural Gas	9.8	MMBtu/hr	8760	4.01	3.37	0.22	0.02	0.08	0.30	0.30	0.23	5,021	0.09	0.01	5,026	0.04
M&R Heater 4 (S007-S008)	Natural Gas	9.8	MMBtu/hr	8760	4.01	3.37	0.22	0.02	0.08	0.30	0.30	0.23	5,021	0.09	0.01	5,026	0.04
Cummins GCMC Generator (S009)	Natural Gas	55.0	kW	8760	0.71	1.42	0.50	0.002	0.03	0.03	0.03	0.03	407.88	0.01	0.001	408.30	0.11
Cummins GCMC Generator (S010)	Natural Gas	55.0	kW	8760	0.71	1.42	0.50	0.002	0.03	0.03	0.03	0.03	407.88	0.01	0.001	408.30	0.11
Fugitive Leaks - Piping	-	-	-	-	-	-	0.07	-	-	-	-	-	0.068	2.24	-	56.18	0.004
Total (tons/yr)					**17.47**	**16.33**	**1.95**	**0.10**	**0.37**	**1.29**	**1.29**	**0.98**	**20,900**	**2.64**	**0.04**	**20,978**	**0.38**
WV Permit Threshold					10 TPY AND 6 lb/hr								N/A				